

Name: _____ ()

Class: _____

INVESTIGATE DIVISIBILITY RULES

Practice 2

Objective:

To investigate and generate divisibility rules for 3 and 6

Instructions:

In this task, you are required to:

- select and apply mathematical problem-solving techniques to recognize divisibility rules for 3 and 6.
- describe the multiples of 3 and 6 as relationships or general rules
- verify whether your divisibility rules works for other examples.

Hints:

1. List some 3-digit numbers, which are multiples of 3 or 6.
2. Investigate the numbers see if you can recognize simple pattern between these numbers.
3. You might find out more than 1 rule to test if a number is completely divided by 3 or 6.
4. Describe your rule in mathematical language (words, sentence, symbol, diagrams, tables, etc.)
5. Test your rule with other bigger numbers (say 4-digit numbers, some divisible by 3 or 6 and some do not).
6. You might use calculator to avoid careless calculation mistake.
7. Present your work neatly, tidily and logically.

Suggested Solution:

Investigate and generate divisibility rules for 3

Step 1: List some small numbers that are multiples of 3 to find the pattern of divisibility rules for 3

3, 6, 9, 12, 15, 18, 21, 24, 27, 30

33, 99, 102, 75, 96, 78, 198, 1311

Step 2: Check the final digits for pattern

By looking at the last digit of the above numbers, they are not clear rules since it can be any of the numbers from 0 to 9.

Step 3: Try adding digits

12 $1+2=3$

15 $1+5=6$

18 $1+8=9$

33 $3+3=6$

99 $9+9=18$

102 $1+0+2=3$

75 $7+5=12$

96 $9+6=15$

198 $1+9+8=18$

1311 $1+3+1+1=6$

Step 4: Describe patterns and rules

From the above step 1 and step 2, I found out that to test if a number is divisible by 3 or not, the last digit doesn't matter.

But when I add the digits, I found out that the sum would always be a multiple of 3, such as: 3, 6, 9, 12, 15, 18...

The divisibility rules for 3 can be when the sum of the digits is divisible by 3, the number itself will be divisible by 3.

Step 5: Test my rule with bigger multiples of 3

Examples	Adding the digits	Applying the rules	Divide the number by 3
37	$3+7=10$	37 is not divisible by 3 since the sum 10 is not a multiple of 3	$37 \div 3 = 12 \text{ R } 1$
111	$1+1+1=3$	111 is divisible by 3 since the sum 3 is a multiple of 3	$111 \div 3 = 37$
2222	$2+2+2+2=8$	2222 is not divisible by 3 since the sum 10 is not a multiple of 3	$2222 \div 3 = 740 \text{ R } 2$
11111111	$1+1+1+1+1+1+1+1=9$	11111111 is divisible by 3 since the sum 9 is a multiple of 3	$11111111 \div 3 = 37037037$
37037037	$3+7+0+3+7+0+3+7=30$	37037037 is divisible by 3 since the sum 30 is a multiple of 3	$11111111 \div 3 = 12345679$

My divisibility rule for 3 is adding the digits of the number and if the sum is divisible by 3, the number will be divisible by 3 too.

I have verified my rules are correct since the sum of 111, 11111111 and 37037037 are 3, 9 and 30, which are divisible by 3. Meanwhile, 37 and 2222 are not divisible by 3 and they don't fulfill the divisibility rules of 3, their sums of digits are 10 and 8, which are not divisible by 3.